

Lower-cost, fume-free labs



● Reaction in process in fume cupboard

The cost of inverter drives has dropped so dramatically in recent years that the application of even very low power drives can yield substantial energy savings. Fumair is a leading UK manufacturer with over 30 years of experience in the design and manufacture of laboratory fume cupboards. Their client list reads like a Who's Who of education, research and development.

Fume cupboards are an essential feature of all laboratories to contain and extract the noxious fumes resulting from the chemical reactions of their experiments. Fumair fume cupboards range in size up to 2m wide and the opening to access them is in the nature of a sash window. At the top they are vented by a fume extraction system with an I.D. fan which maintains negative pressure within the cupboard, preventing fumes from escaping back into the laboratory. Under all circumstances this negative pressure must be maintained, subject to regulation by EN14175. Although their extract fans range only up to 0.75kW for a single fume cupboard, Fumair's R&D programme has established that inverter control of airflow through their fume cupboards provides their clients with welcome energy savings at almost no extra cost over the mechanical alternative.

Full speed operation of the fan is seldom necessary and is noisy and uneconomical. Switching between three operating speeds offers the quietest and most economical solution. EN14175 demands that the air speed at the discharge is at least 10m/sec and this is achieved at a pre-set minimum fan speed when the fume cupboard itself is not actually in use but any fumes from the storage facility below the cupboard are vented through the cupboard.

The highest speed, around 1200rpm, is required to maintain negative pressure at maximum airflow when the sash is fully open. With the sash closed down, the fan can be dropped to an economical pre-set middle speed, around 900 rpm, saving a great deal of energy in driving the fan. Simple micro-switches detect the sash position and select the appropriate pre-set fan speed. A fully adjustable system is available whereby the internal pressure of the fume cupboard is sensed by a transducer and used to control the speed of the fan more precisely but is more costly without yielding substantial additional savings.

Fumair has had great success using Hitachi L200 single phase inverters to drive their extract fans. According to Paul Clarke, Managing Director of Fumair, 'Surprisingly, fitting an inverter entails no extra cost. It simplifies the electrical wiring requirements by enabling us to control a standard 3-phase motor from a single phase supply and eliminates the cost of D.O.L. starters, motor protection and dampers on the outlet. In return, it provides multiple benefits to the customer. Even at low power ratings the energy savings are substantial. Every lab has a different duty cycle but savings of between £1,000 and £2,500 per annum are typical depending upon the size of the fume cupboard. Extract air is conditioned

APPLICATION BENEFITS

- IMPROVED CONTROL FOR LITTLE EXTRA OUTLAY
- COST RECOVERY FROM ENHANCED ENERGY SAVINGS
- SIMPLIFIED INSTALLATION AND WIRING
- SIGNIFICANT NOISE REDUCTION IN OPERATION
- ENABLES USE OF MORE RELIABLE 3-PHASE CAGE MOTOR FROM SINGLE PHASE SUPPLY
- MAINTENANCE DOWNTIME ELIMINATED

air from the lab itself and so there are significant savings in limiting the airflow. Running the fans at full speed, on a 1500mm wide fume cupboard, costs over £5 per hour. On a 24/7 basis, that multiplies up to over £2,000 per annum per fume cupboard. With inverter speed control, that drops to under £500. Motor protection is also

improved, maintenance downtime is virtually eliminated, safety is enhanced with the minimum speed facility and, critically, fan noise is substantially diminished, a vital consideration in a teaching environment. Adopting the Hitachi inverters has been a win-win development for us and our customers.'



● Checking the fume cupboard airflow



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